REMARKS

As explained below, the primary reference upon which the examiner relied when rejecting the original claims, i.e., the Rissman et al. patent, is not prior art against which the methods of the remaining pending claims may be evaluated. For that reason, applicants respectfully request the examiner to allow claims 16-24 to issue.

Objection to the drawings

The examiner objected to the drawings for not including the reference sign "205" mentioned in the description. In response, applicants submit corrected drawings, which were modified by adding reference sign "205" to figure 2b. It will be apparent to anyone skilled in the art that "trench 205" (mentioned in the specification at page 10, line 8) is located where reference sign "205" was added to figure 2b. For that reason, modifying figure 2b to include that reference sign does not add any new matter. In view of this correction, applicants respectfully request the examiner to withdraw the objection to the drawings.

Rejection Under 35 U.S.C. §112

The examiner rejected claims 3 and 4 under 35 U.S.C. §112 because the term "near" purportedly renders those claims indefinite. Applicants have canceled claims 1-15, obviating the need to respond to this rejection.

Rejection Under 35 U.S.C. §102(e) Based on Rissman et al.

The examiner rejected claims 1, 2, 5, 7, 16, and 21 under 35 U.S.C. §102(e) as being anticipated by Rissman et al. Applicants have canceled claims 1, 2, 5, and 7, obviating the need to respond to this rejection as it pertained to those claims.

Concerning claims 16 and 21, the patent application for the Rissman patent was filed November 1, 2001. Because applicants are entitled to a date of invention prior to that filing date, that patent does not have prior art status under 35 U.S.C. §102(e). For that reason, the examiner cannot rely upon Rissman to reject pending claims 16 and 21 under 35 U.S.C. §102(e).

An applicant can submit an appropriate oath or declaration to overcome a patent, upon which a rejection under 35 U.S.C. §102(e) is based. An applicant can overcome such a patent by showing conception of the invention prior to the effective date of the reference coupled with due diligence from prior to that effective date to the filing of the patent application. 37 C.F.R. §1.131 and MPEP 715.

Accompanying this response are the Declaration of R. Scott List Under 37 C.F.R. §1.131 ("List Declaration") and the Declaration of Mark V. Seeley Under 37 C.F.R. §1.131 ("Seeley Declaration"). Those declarations establish conception of the claimed invention prior to Rissman's November 1, 2001 filing

date. In addition, they establish due diligence from prior to that date to the application's filing date.

Concerning conception, Messrs. List and Hau-Reige (co-inventors for this application) described their invention in an invention disclosure, which they sent to the Intel legal department prior to November 1, 2001. In that invention disclosure, the inventors described a method for improving interconnect electromigration reliability through local doping of the interconnect. That invention disclosure described and illustrated two techniques for performing such a local doping operation. The first technique (illustrated by figures 3(a) -3(c) of the invention disclosure at page 9) comprised forming a conductive layer on a substrate, forming a dielectric layer on the conductive layer, etching a via through the dielectric layer to expose part of the conductive layer, then introducing a dopant into that exposed part of that layer. The second technique (illustrated by figures 4(a) -4(b) of the invention disclosure at page 10) comprised forming a dielectric layer on a substrate, etching the dielectric layer to form a via and trench, filling the via and trench with a conductive layer, exposing part of the conductive layer, then introducing a dopant into that exposed part of that layer. (See List Declaration ¶ 2 and the accompanying Exhibit A.)

The List Declaration and accompanying exhibit thus establish conception of the claimed invention prior to November 1, 2001. Concerning due diligence, the Intel legal department received the invention disclosure in April, 2001. (See

Seeley Declaration ¶ 2 and the accompanying Exhibit A.) The invention disclosure was assigned to an Intel invention review committee for evaluation. The committee met to review that invention disclosure, along with many others, on May 22, 2001. At that time, the committee chose to file a patent application for the invention described in the invention disclosure. The application was assigned to Mr. Seeley for drafting on June 1, 2001. (See Seeley Declaration ¶ 3.)

After receiving the file, Mr. Seeley generated an initial draft of a patent application for the invention described in the invention disclosure prior to discussing the invention with either of the inventors. (See Seeley Declaration ¶ 4.) After obtaining inventor feedback on the initial draft, Mr. Seeley sent a revised draft to the inventors for review. (See Seeley Declaration ¶ 5.) After Messrs. List and Hau-Reige determined that a revised draft of the application accurately and completely described their invention, they signed Declaration and Power of Attorney forms, and assignments, and forwarded those documents to Mr. Seeley. (See List Declaration ¶ 4 and Seeley Declaration ¶ 6.)

After receiving those documents (signed on either November 17, 2001 or November 27, 2001), and after an information disclosure statement was generated for the application, Mr. Seeley had the patent application filed on November 30, 2001, constructively reducing to practice the claimed invention. (See Seeley Declaration ¶ 7.) The List Declaration and Seeley Declaration, and

the accompanying exhibits, thus establish due diligence from prior to November 1, 2001 through to the constructive reduction to practice of the claimed invention on November 30, 2001.

Because applicants are entitled to a date of invention prior to November 1, 2001, the examiner cannot rely upon Rissman et al. to support a rejection of pending claims 16 and 21 under 35 U.S.C. §102(e). Consequently, applicants respectfully request the examiner to withdraw the rejection of those claims based upon that reference.

Rejection Under 35 U.S.C. §103(a) Based on Rissman et al. in view of Stumborg et al

The examiner rejected claims 6, 8-15, 17-20, and 22-24 under 35 U.S.C. §103(a) as being unpatentable over Rissman et al. in view of Stumborg et al.. The examiner concluded that it would have been obvious to modify Rissman with the teachings of Stumborg to make a semiconductor device having a barrier film to improve performance.

The examiner cannot rely upon Rissman to support a rejection under 35 U.S.C. §103(a) because, as explained above, that patent does not have prior art status under 35 U.S.C. §102(e). As a result, the examiner cannot properly rely upon the method Rissman describes to attempt to reconstruct applicants' invention by combining various features from Rissman with various features from Stumborg to support a rejection under 35 U.S.C. §103(a).

Stumborg alone does not teach or suggest the invention of any of pending claims 16-24. Stumborg describes forming a thin diffusion barrier (e.g., diffusion barrier layer 47 in Stumborg's figure 8) between a plug of copper and a semiconductor substrate, and forming another diffusion barrier (e.g., barrier 49 in figure 8) between the copper plug and an insulating layer. Stumborg's barrier layers prevent diffusion of copper into the semiconductor substrate and the insulating layer. They do not introduce a dopant into part of a conductive layer, as each of pending claims 16-24 specifies. Nor does Stumborg suggest modifying the method it describes to include such a process step.

Because Rissman does not constitute prior art, and because Stumborg alone does not describe or suggest the methods of pending claims 16-24, the examiner cannot properly reject those claims based on those references. Consequently, applicants respectfully request the examiner to withdraw the rejection of the pending claims based upon the combination of Rissman and Stumborg.

Because the methods of pending claims 16-24 are patentable over the cited references, applicants respectfully request the examiner to allow those claims to issue.

Respectfully submitted,

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